

Indicator 16. Area and Percent of Forest Land Subjected to Levels of Specific Air Pollutants (e.g., Sulfates, Nitrate, Ozone) or Ultraviolet That May Cause Negative Impacts on the Forest Ecosystem

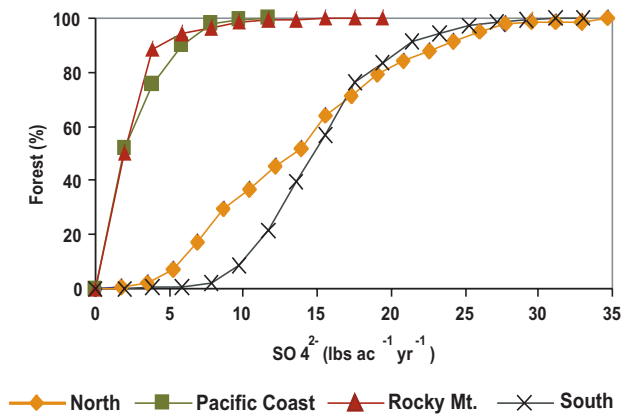


Figure 16-1. Cumulative distribution function of percent of forest subject to specific levels of wet SO_4 deposition (1994–2000).

What Is the Indicator and Why Is It Important?

Air pollutants are considered to have a significant cumulative effect on forest ecosystems. They affect regeneration, productivity, and species composition. In the United States, inputs of sulfur, nitrogen, and tropospheric ozone are of primary concern in forested ecosystems. Their effects include soil and water acidification, base cation depletion, and foliar injury.

What Does the Indicator Show?

Air pollution exposure was generally highest in the Eastern United States (North and South Resource Planning Act [RPA] regions). Annual estimates of sulfate deposition for forested areas decreased across RPA regions from 1994 through 2000. Those trends were statistically significant in the North and South RPA regions, where approximately 50 percent of the forest was exposed to sulfate deposition of more than $13.4 \text{ lbs ac}^{-1} \text{yr}^{-1}$ for the period. Nitrate deposition rates were lowest in the Pacific Coast and Rocky Mountain RPA regions. In those areas, approximately 84 percent of the forest received less than $4.2 \text{ lbs ac}^{-1} \text{yr}^{-1}$ from 1994 through 2000, as compared to the North and South RPA regions where only 2 percent of

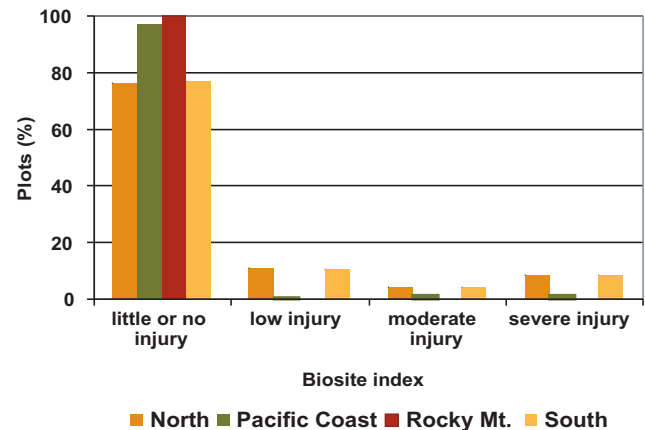


Figure 16-2. Histogram of percent of ozone biomonitoring plots with low, moderate, or severe foliar O_3 injury recorded.

the forest received less than $4.2 \text{ lbs ac}^{-1} \text{yr}^{-1}$ of nitrate deposition. Ozone exposure was highest across the South RPA Region and in southern California; however, little or no ozone injury to plants was recorded on most ozone biomonitoring plots across RPA regions. In the North and South RPA regions, approximately 77 percent of the biomonitoring plots received little or no ozone injury. In the Pacific Coast and Rocky Mountain RPA regions, 97 percent and 100 percent, respectively, of the biomonitoring plots had little or no injury from ambient levels of tropospheric ozone. Only a small portion of plots, mostly in the North and South RPA regions, had severe foliar injury. Results from multivariate analysis showed the oak-hickory and loblolly-shortleaf forest type groups were generally exposed to more air pollution than other forest types. Conversely, western white pine and larch forest type groups were exposed to less air pollution than all other forest types. Currently, it is not known if the specific levels of sulfate, nitrate, and ammonium deposition reported cause large-scale negative effects on forest ecosystems even though smaller-scale effects have been observed (e.g., high-elevation spruce-fir forests).